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IS 15364 (2003): Automotive Vehicles - Spark-Pluge M10 X 1 with Flat Seating [TED 11: Automotive Electrical Equipment]

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भारतीय मानक

स्वचल वाहन — स्पाट बैठने वाले एम10 × 1 स्पार्क-प्लग तथा उनके सिलिंडर शीर्ष में फिटिंग

Indian Standard

AUTOMOTIVE VEHICLES — SPARK-PLUGS M10 × 1 WITH FLAT SEATING

ICS 43.060.50

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BUREAU OF INDIAN STANDARDS
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

July 2003 **Price Group 4**

Automotive Electrical Equipment Sectional Committee, TED 11

FOREWORD

This Indian Standard was adopted by the Bureau of Indian Standards, after the draft finalized by the Automotive Electrical Equipment Sectional Committee had been approved by the Transport Engineering Division Council.

This standard is a necessary adjunct to the following Indian Standards on spark plugs:

IS No.	*Title*
1062 : 1963	Methods of test for sparking plugs (*revised*)
1063 : 1997	Automotive vehicles — M14 × 1.25 spark-plugs with flat seating and their cylinder head housing (*second revision*)

This standard aims to meet the requirements of automotive vehicles increasingly using this type of spark-plug. While preparing this standard considerable assistance has been derived from ISO 2704 : 1998 'Road vehicles M10 × 1 spark-plugs with flat seating and their cylinder head housing' and ISO 14508 : 1997 'Road vehicles — Spark-plug — Terminals'.

The composition of the Committee responsible for the formulation of this standard is given in Annex B.

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated expressing the result of a test or analysis, shall be rounded off in accordance with IS 2 : 1960 'Rules for rounding off numerical values (*revised*)'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

Indian Standard

AUTOMOTIVE VEHICLES — SPARK-PLUGS M10 × 1 WITH FLAT SEATING

1 SCOPE

This standard specifies the main characteristic of M10 × 1 spark-plugs with flat seating with normal or long reach and their cylinder head housing, for use with spark-ignition engines.

2 REFERENCES

The following standards contain provisions which through reference in this text, constitute provisions of this standard. At the time of publication, the editions indicated were valid. All standards are subject to revision and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below:

IS No.	*Title*
1062 : 1963	Methods of test for sparking plugs (*revised*)
4218	ISO Metric screw threads:
(Part 1) : 1976	Basic and design profiles (*first revision*)
(Part 2) : 1976	Diameter pitch combinations (*first revision*)
(Part 3) : 1976	Basic dimensions for design profiles (*first revision*)
(Part 4) : 1976	Tolerances system (*first revision*)
(Part 5) : 1979	Tolerances (*first revision*)

3 REQUIREMENTS

3.1 Terminals

The spark-plug terminal may be either the solid post or the threaded type. A spark-plug with threaded terminal on which a nut is applied shall match the dimensions specified for spark-plugs with solid post terminal [*see* Fig. 1(a) and 1(b)].

3.2 Dimensions and Threads (*see* Fig. 1 to 4)

3.2.1 *Spark-Plug Reach*

The spark-plug reach shall meet the requirements given in Table 1.

3.2.2 *Gasket*

When the spark-plugs have been tightened with a torque of 15Nm, on threads that are clean, smooth and dry, the gaskets shall retain 1.0 mm to 1.6 mm thickness. If the gasket thicknesses are different, a corresponding adjustment to dimensions *A*, *B* and *Y* shall be made.

Non-captive gaskets may be used only in special cases.

Table 1 Dimensions of Reach of Spark-Plugs

(*Clause* 3.2.1)

All dimensions in millimetres.

Type of Reach (1)	*A* ± 0.2 (2)	*B* *Max* (3)	*Y* ± 0.3 (4)
Normal reach	12.7	19	11.7
Long reach	19	27	18

3.2.3 *Threads*

3.2.3.1 *Spark plug and cylinder head*

The threads M10 × 1 of spark-plugs and the corresponding tapped holes in the cylinder head shall conform to IS 4218 (Parts 1 to 5). Their dimension limits and their tolerance classes shall be as specified in 3.2.3.2 and 3.2.3.3 respectively.

3.2.3.2 *Dimension limits of the M10 × 1 thread*

The dimension limits are given in Table 2.

Table 2 Dimensions of M10 × 1 Thread Profile

(*Clause* 3.2.3.2)

All dimensions in millimetres.

Sl No. (1)	Dimension (2)		Plug Thread (Finished Plug) (3)	Tapped Hole in Cylinder Head (4)
i)	Major diameter	Maximum	9.974	Not specified
		Minimum	9.794	10.000
ii)	Pitch diameter	Maximum	9.324	9.500
		Minimum	9.212	9.350
iii)	Minor diameter	Maximum	8.747	9.153
		Minimum	8.563[1]	8.917

[1] With a root radius > 0.100 mm (0.1P).

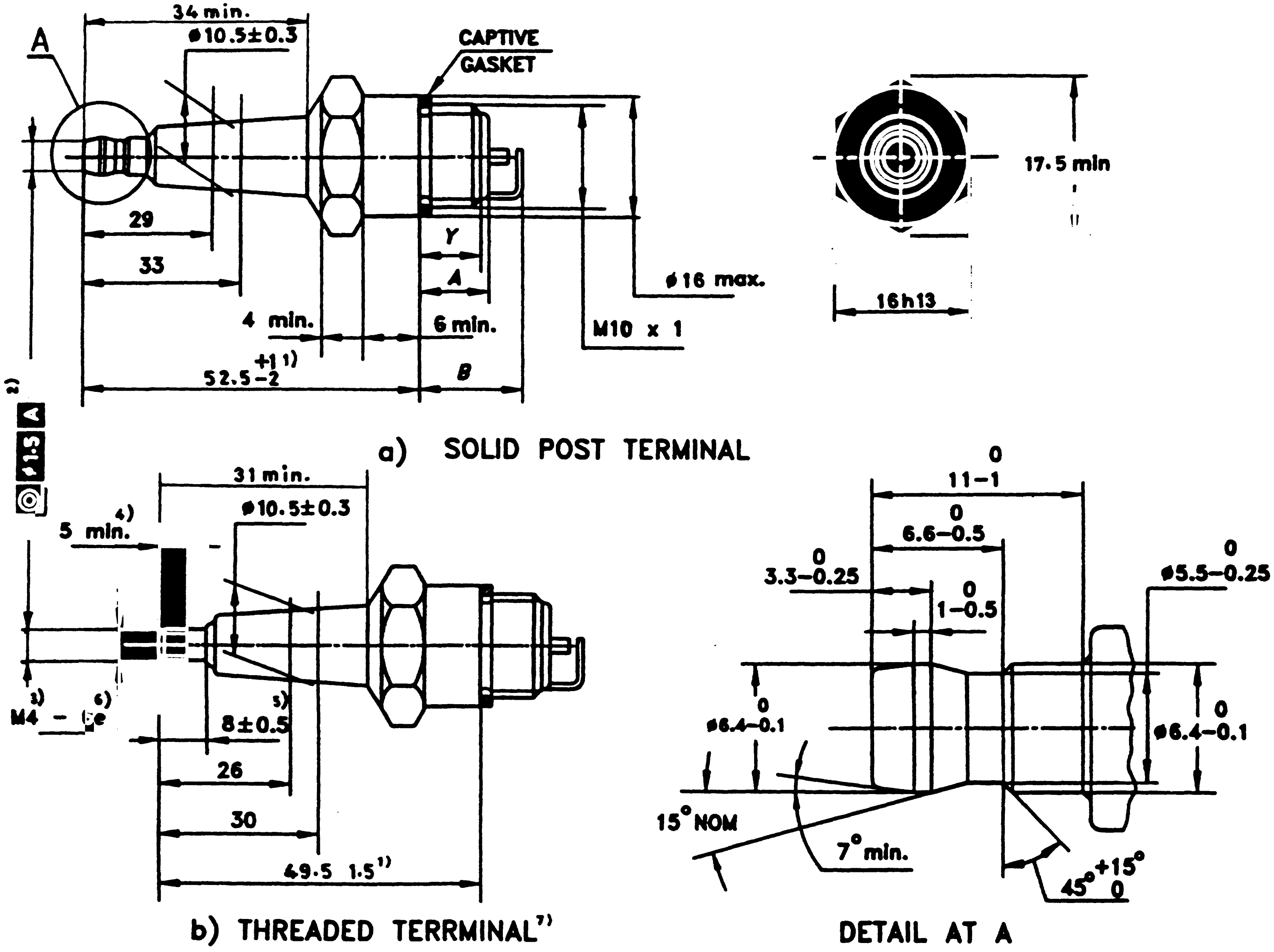
3.2.3.3 *Tolerance classes*

The thread tolerance classes for finished M10 × 1 spark-plugs and for the corresponding tapped holes in the cylinder head are as follows:

a) 6g for spark-plugs (*see* Note 1), and
b) 6H for tapped holes in the cylinder head.

NOTES

1 In order that spark-plugs complying with this standard can be fitted in existing cylinder heads also in extreme cases, the value for the maximum truncation of the minor diameter of the



a) SOLID POST TERMINAL

b) THREADED TERRMINAL 7)

DETAIL AT A

FIG. 1 M10 × 1 SPARK-PLUG WITH FLAT SEATING AND FULL THREAD

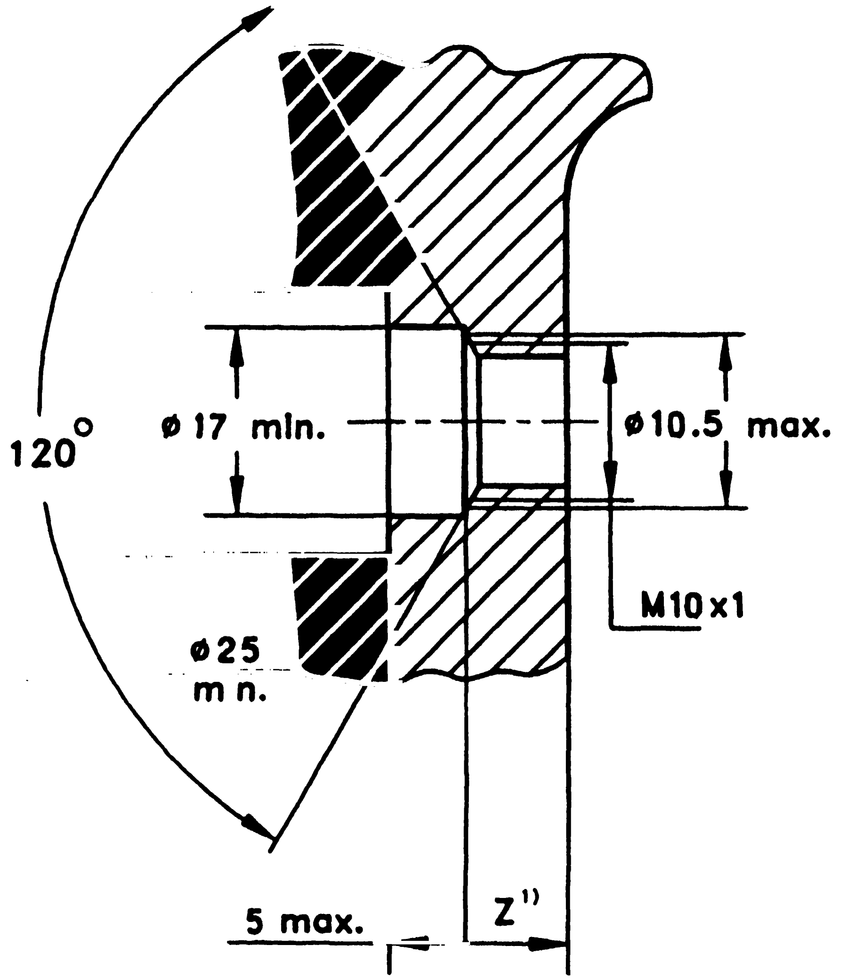


FIG. 2 HOUSING OF SPARK-PLUG WITH FULL THREAD IN CYLINDER HEAD

spark-plug base has been slightly reduced.

2 This maximum value of the minor diameter is calculated from a distance of $H/6$ for the maximum truncation.

Minor diameter, *Max* $= d_1 - es - 2(H/4 - H/6)$
$= 8.917 - 0.026 - 0.144$
$= 8.917 - 0.170 = 8.747$

3 The value for the basic profile is the difference between maximum diameter minus 0.026 that is, $8.917 - 0.026 = 8.891$.

4 The initial clearance $g = 0.026$ mm between the pitch diameters of the thread and of the tapped hole is intended to prevent the possibility of seizure, as a result of combustion deposits on the bare threads, when removing the spark plugs. This clearance is also intended to enable spark-plugs with thread profile as per this standard to be fitted in tapped holes.

3.2.3.4 *Threaded terminal*

For spark-plugs with a threaded terminal, the thread tolerance class of the terminal [*see* Fig. 1(b)] is 6*e*. Depending on manufacturing processes, class 7*e* is acceptable on the finished product. Nuts for use with threaded terminals shall have internal threads to 6*H* tolerance prior to assembly on the threaded post.

3.3 Other Dimensions of Spark-Plug and Housing in Cylinder Head

The other dimensions shall be as indicated in Fig. 1 to 4.

Dimensions 52.5 mm on spark-plugs with solid post terminal and 49.5 mm on spark-plugs with threaded terminal shall be measured when the spark-plugs have been tightened according to **3.2.2**.

The contour of the insulator is optional; however, between the reference planes defined for spark-plugs with solid post terminals by the dimensions 29 mm and 33 mm and for spark-plugs with threaded terminals by the dimensions 26 mm and 30 mm, its largest diameter shall be 10.5 mm ± 0.3 mm or 10.0 mm ± 0.3 mm.

NOTE — Although like value may be used depending upon the agreement between the purchaser and the supplier. However the nominal value 10.5 mm, shall be preferred.

The *Z* length of the spark-plug housing in the cylinder head shall be sufficient to ensure that the end of the spark-plug thread does not project into the combustion

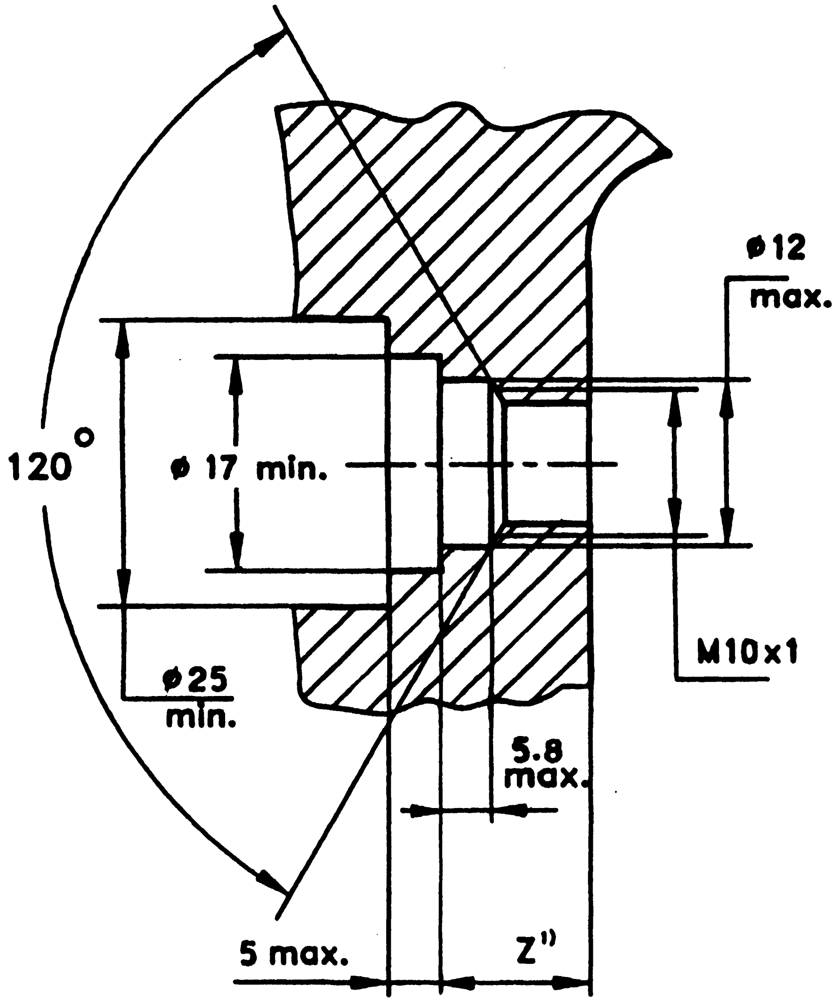


FIG. 3 HOUSING OF SPARK-PLUG WITH HALF THREAD IN CYLINDER HEAD

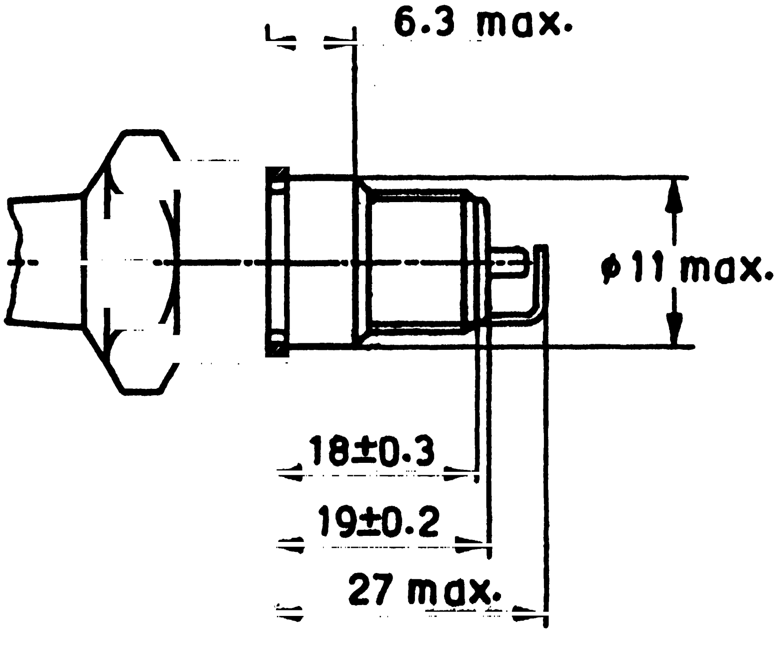


FIG. 4 M10 × 1 SPARK-PLUG WITH FLAT SEATING AND HALF THREAD

chamber at any point when the gasket is tightened to its maximum specified torque.

3.3.1 Any other details not specified shall be as agreed to between the purchaser and the supplier.

3.4 Installation Tightening Torque

The installation torque values apply to new spark-plugs without lubricant on the threads. If threads are lubricated, the torque value shall be reduced by approximately one-third to avoid over stressing.

Spark-plugs shall be tightened with a torque of 10 Nm to 15 Nm in aluminum and in cast iron cylinder heads.

3.4.1 The engine manufacturers may also specify different torque value for the first spark-plug installation.

4 ACCEPTANCE TESTS AND REQUIREMENTS

The acceptance tests which are carried out on samples for the purpose of acceptance of a lot, shall be carried out in accordance with the methods prescribed in IS 1062 and the plugs shall comply with the requirements given in Table 3.

Table 3 Requirements for Sparking Plungs

(*Clause* 4)

Sl No. (1)	Test (2)	Requirement (3)
i)	Sparking under pressure	Sparking shall be regular and of equal intensity
ii)	Insulation resistance under heat, *Min*	1 megohm
iii)	Gas leakage under room temperature, *Max*	5 ml/min
iv)	Gas leakage under heat, *Max*	50 ml/min
v)	Thermal shock test	There shall be no crack on the insulation
vi)	Mechanical impact strength of insulator:	
	a) Impact energy, the plugs shall sustain, *Min*	1.5 kgf.cm
	b) Breaking impact energy, average	33 kgf.cm
vii)	Torque strength	No breakage at the throat

5 SAMPLING

The sampling procedure shall be subject to agreement between the supplier and the purchaser. As a guide to this agreement, a recommended sampling plan is given in Annex A.

6 INSPECTION AND TESTING FACILITIES

The manufacturer shall afford to the purchaser or his authorized representative, subject to prior agreement, all testing facilities for satisfying himself that sparking plugs are being or have been manufactured fully in accordance with the requirements of this standard and for this purpose the purchaser or his representative shall have access, at all reasonable times, to the manufacturer's or supplier's premises and may require him to deliver representative samples for inspection and tests at the manufacturer or suppliers' premises or at any other place mutually agreed upon.

7 MARKING

7.1 Each spark-plug shall be legibly and indelibly marked with the following:

a) Manufacturer's name or registered trade-mark,
b) Lot or batch number, and
c) Country of manufacture.

7.2 BIS Certification Marking

The product may also be marked with the Standard Mark.

7.2.1 The use of the Standard Mark is governed by the provisions of the *Bureau of Indian Standards Act*, 1986 and the Rules and Regulation made thereunder. The details of conditions under which the licence for the use of the Standard Mark may be granted to manufacturers or producers, may be obtained from the Bureau of Indian Standards.

8 PACKAGING

8.1 The threaded portion of the plug shall be lightly smeared with oil or grease and protected against risk of mechanical injury by means of a cardboard sleeve. Each plug shall be packed in cardboard box separeately. A suitable number of such plugs, say 1 to 15, shall be packed in a big carton.

8.2 The packing for original equipment for engine manufacturers shall be subject to prior agreement between the purchaser and the manufacturer.

ANNEX A

(*Clause* 5)

RECOMMENDED SAMPLING PLAN

A-1 SCALE OF SAMPLING

A-1.1 Lot

In any consigment, all sparking plugs of the same body reach and manufactured under similar conditions of production, shall be grouped together to constitute a lot.

A-1.2 The number of sparking plugs to be selected at random from the lot shall be in accordance with col 1 and 2 of Table 4 if required (*see* **A-3.2.1**), additional sparking plugs as given in col 3 of Table 4 shall also be selected at random.

Table 4 Sample Size and Criterion for Conformity

(*Clause* A-1.2)

Lot Size (1)	N_1 (2)	N_2 (3)	N_1+N_2 (4)	C_1 (5)	C_2 (6)	Sub-Sample Size (7)
Up to 150	13	13	26	0	1	3
151 to 280	20	20	40	0	3	4
281 to 500	32	32	64	1	1	5
501 to 1 200	50	50	100	2	1	6
1 201 and above	80	80	160	3	8	7

NOTE — If the sample size is greater than the lot size, all the plugs in the lot shall be inspected.

A-2 NUMBER OF TESTS

A-2.1 All the sparking plugs selected as in **A-1.2** shall be inspected for dimensions shown as in Fig. 1 to 3 and for sparking under pressure (*see* Table 3).

A-2.2 the number of sparking plugs as given in col 7 of Table 4 shall be tested for insulation resistance under heat [*see* Table 3, Sl No. (ii)], gas leakage under room temperature [*see* Table 3, Sl No. (iii)]. Gas leakage under heat [*see* Table 3, Sl No. (iv)], thermal shock test [*see* Table 3, Sl No. (v)], mechanical impact strength of insulator [*see* Table 3, Sl No. (vi)] and torque strength (*see* Table 3, Sl No. (vii), these sparking plugs shall be taken from those selected in **A-1.2**.

A-3 CRITERION FOR CONFORMITY

A-3.1 The lot shall be considered as conforming to the requirements of this standard if the condition mentioned in **A-3.2** and **A-3.3** are satisfied.

A-3.2 The number of defective sparking plugs (sparking plugs which do not satisfy the requirement mentioned in **A-2.1**) out of the first sample N_1 shall not exceed C_1 as given in col 5 of Table 4. The lot shall be rejected if the number of defective sparking plugs is equal to or greater than C_2 as given in col 7 of Table 4.

A-3.2.1 If the number of defective sparking plugs is between C_1 and C_2, a further sample of N_2 sparking plugs as given in col 3 of Table 4 shall be selected and inspected for requirements mentioned in **A-2.1**. The number of defective sparking plugs out of the total $N_1 + N_2$ sparking plugs shall not exceed C_2. The lot shall be rejected if the total number of defective sparking plugs is equal to or greater than C_2.

A-3.3 All the sparking plugs tested for the characteristics mentioned in **A-2.2** shall satisfy the corresponding requirements. If one or more sparking plugs fail to satisfy any test(s), twice the number of sparking plugs shall be selected and tested for characteristics in which failure has occurred. All these sparking plugs shall satisfy the corresponding requirements.

ANNEX B

(*Foreword*)

COMMITTEE COMPOSITION

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(*Continued on page* 8)

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